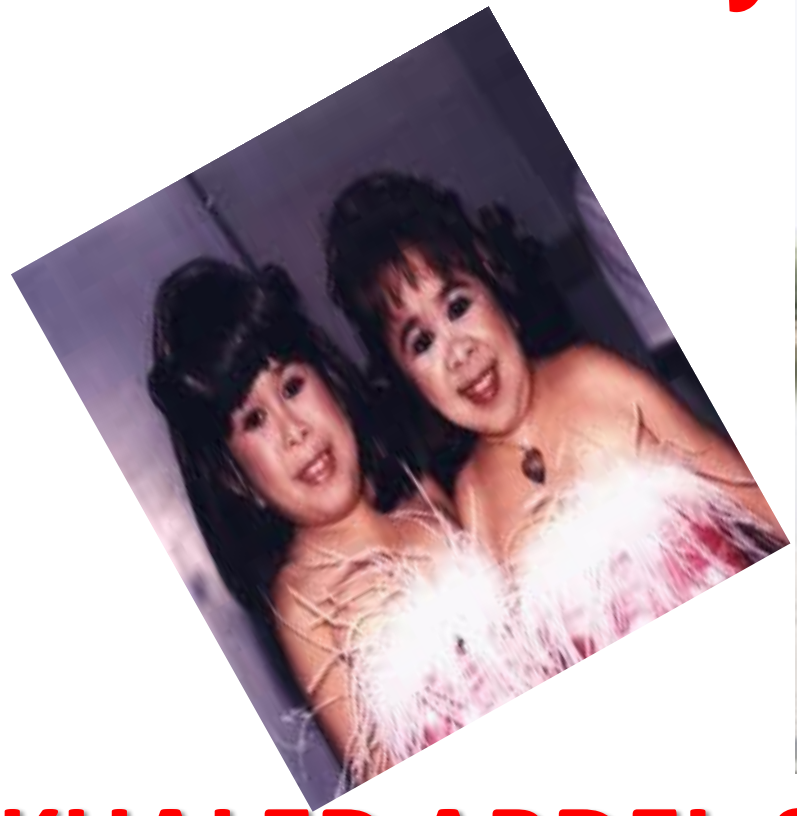
Anterior Pituitary Gland



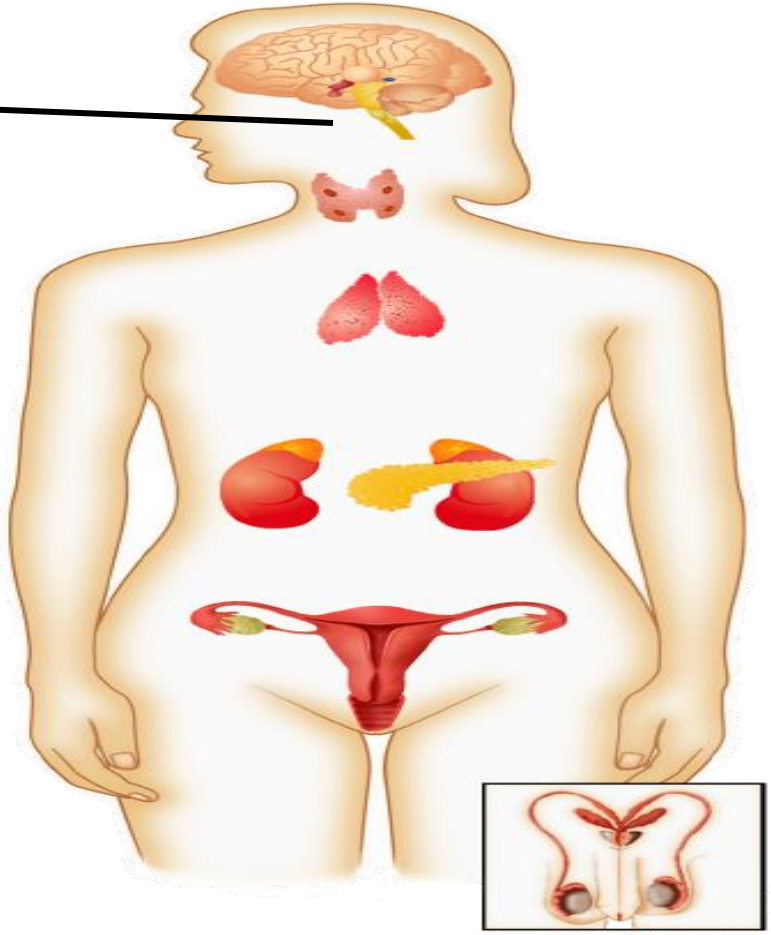
PROF. KHALED ABDEL-SATER,

Professor of Physiology

Anterior pituitary gland

MASTER GLAND

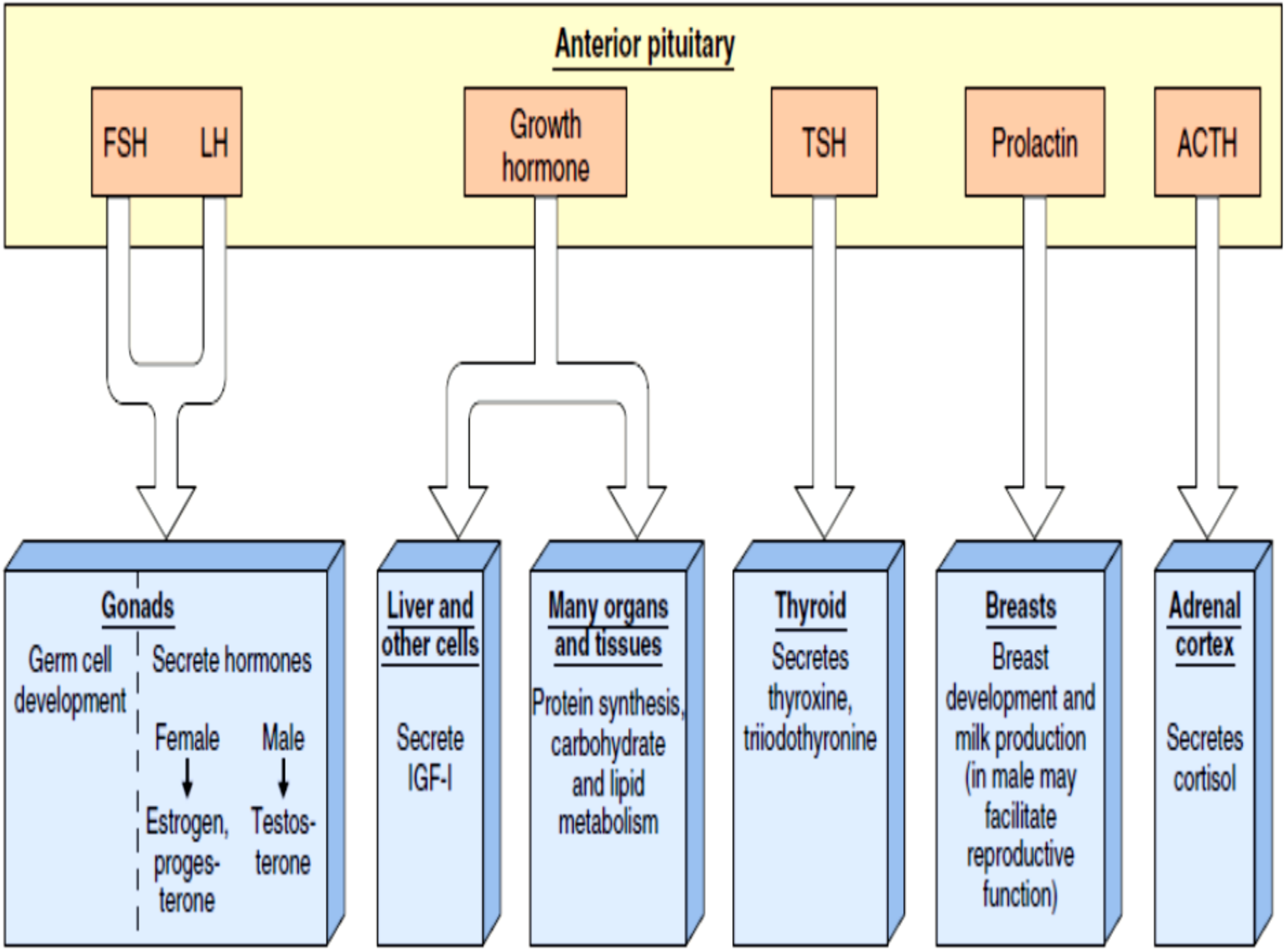
The anterior pituitary gland produces hormones that regulate many of the other endocrine glands.



N.B.: Some endocrine glands not under control of anterior pituitary e.g. posterior pituitary, pineal, parafollicular cells of thyroid, parathyroid, pancreas, and adrenal medulla.

THE ANTERIOR PITUITARY HORMONES

1-Growth hormone (GH, Somatotropin).
2-Prolactin (PL, lactogenic hormone, mammotropin).
3-Thyroid stimulating hormone (TSH, thyrotropin).
4-Adrenocorticotrophic hormone (ACTH, corticotropin).
5-Gonadotropic hormones (GnH, gonadotropin):
A- Follicle stimulating hormone (FSH).
B- Luteinizing hormone or interstitial cell stimulating hormone (LH, ICSH)

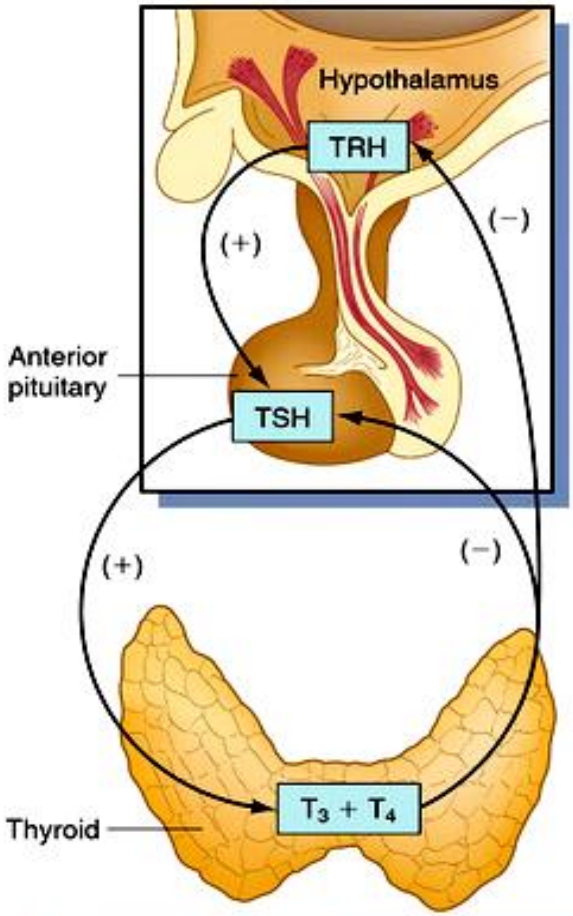

Anterior pituitary
FSH
LH
Growth hormone
TSH
Prolactin
ACTH
Gonads
Germ cell development
Secrete hormones
Female
Estrogen, proges-terone
Male
Testos-terone
Liver and other cells
Secrete IGF-I
Many organs and tissues
Protein synthesis, carbohydrate and lipid metabolism
Thyroid
Secretes thyroxine, triiodothyronine
Breasts
Breast development and milk production (in male may facilitate reproductive function)
Adrenal cortex
Secretes cortisol

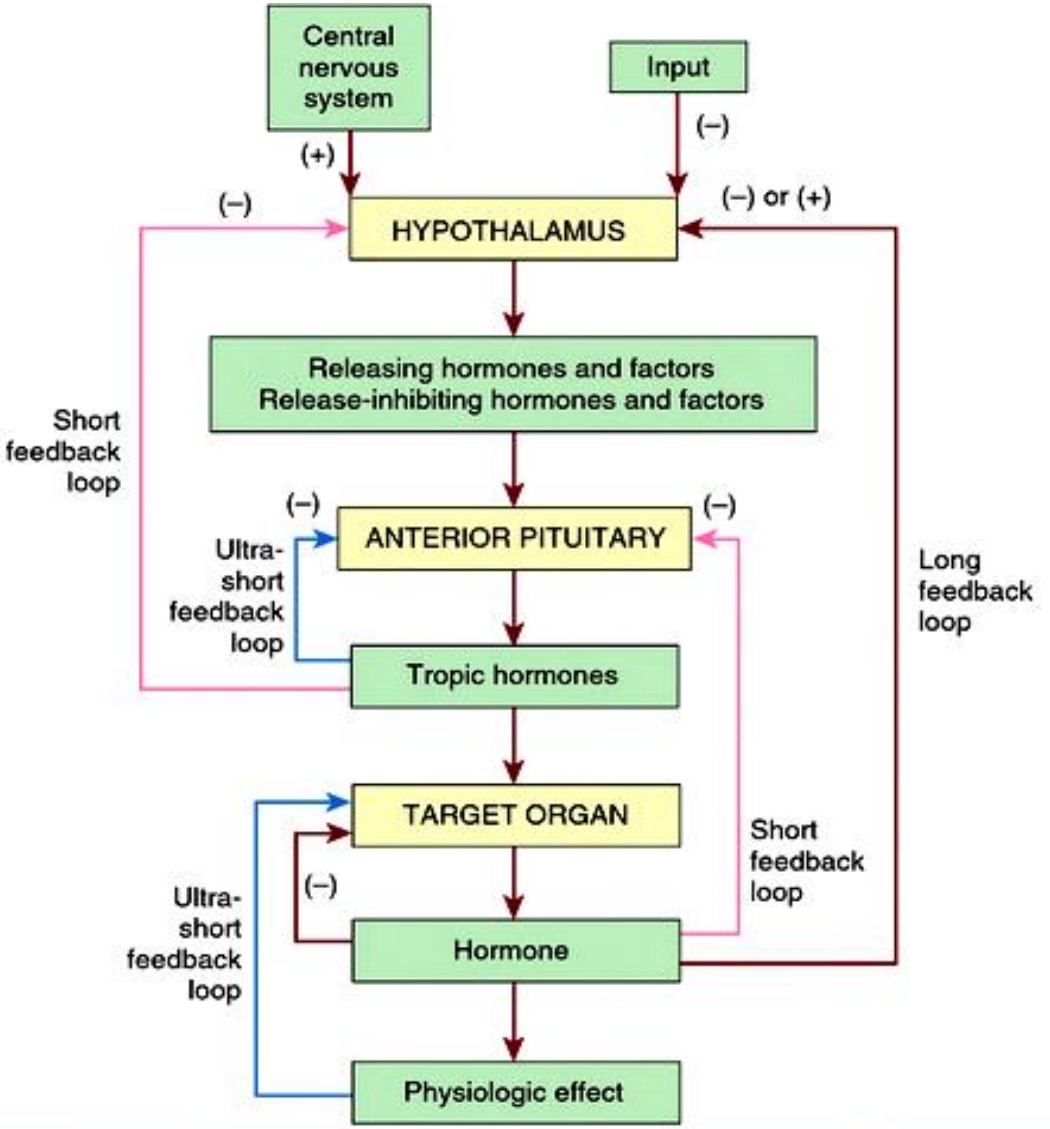
CONTROL OF THE ANTERIOR PITUITARY GLAND SECRETIONS:

1- The Hypothalamic Control by releasing and inhibitory hormones).

The hypothalamic hormone	Anterior pituitary hormone
• Growth hormone-releasing hormone (GHRH). • *Growth hormone release-inhibiting hormone (GHIH)* or (somatostatin).	Growth hormone
• *Prolactin-inhibiting factor (PIF) (dopamine).*	Prolactin
• Thyrotropin-releasing hormone (TRH).	TSH
• Corticotropin-releasing hormone (CRH).	ACTH
• Gonadotropin releasing hormone (GnRH).	FSH & LH

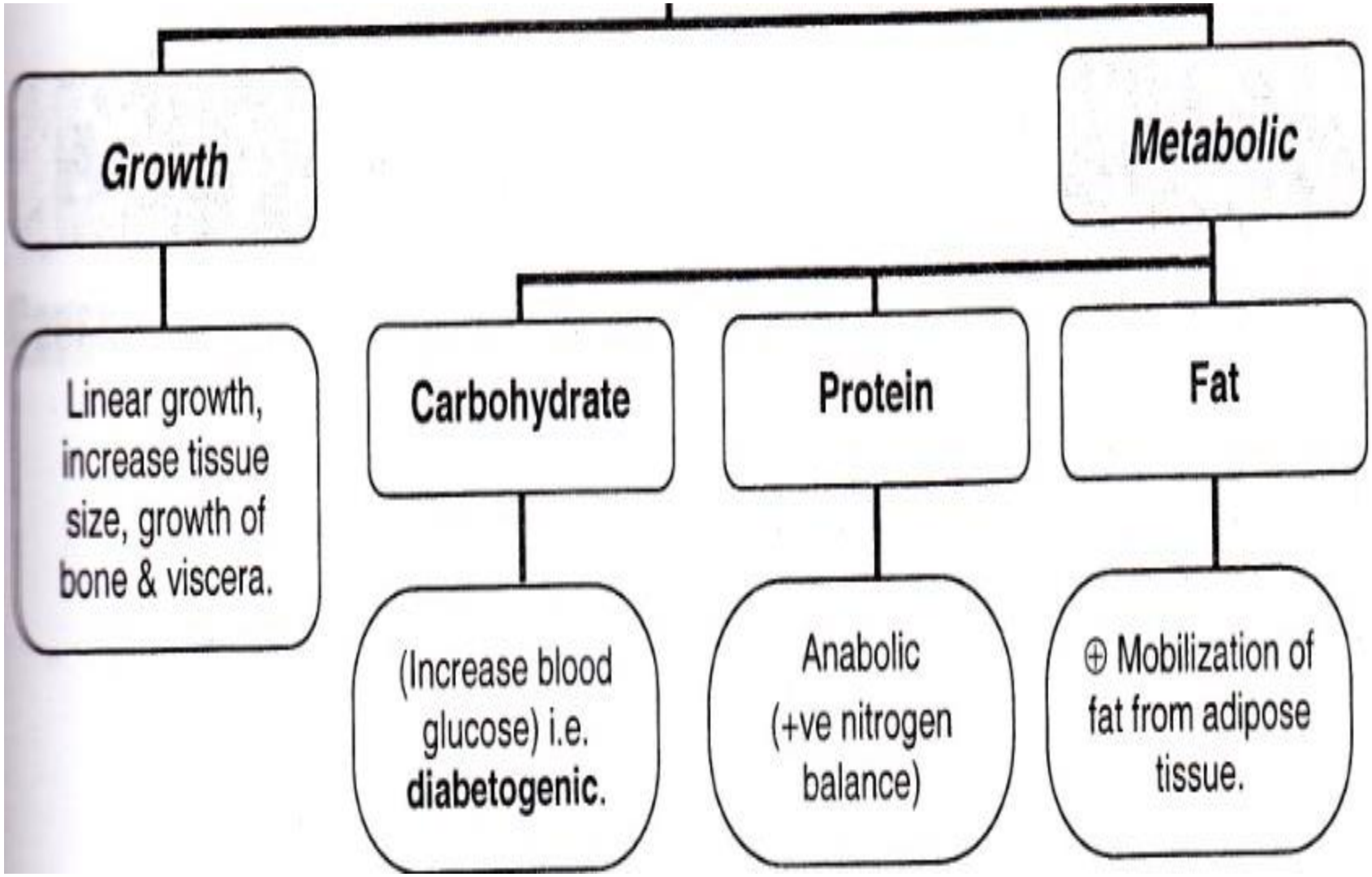
2- Feed Back Control





Growth Hormone

Functions of Growth Hormone



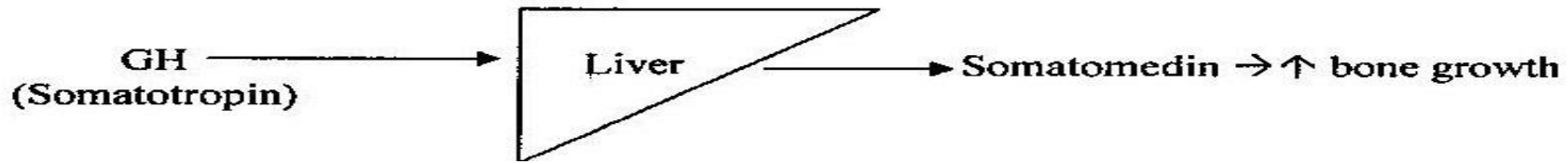
Functions of Growth Hormone

1- Growth Function:

A- Stimulation of Growth of Cartilage and Bone (Linear Growth):

1- Before closure of epiphysis *(up to 17-21 years):* It causes chondrogenesis (deposition of new cartilage) then ossification.

2- After closure of epiphysis ↑ *the thickness of the bone.* ***-Mechanism:*** **Indirectly by of**



B- GH stimulates growth of all tissues of the body including *skeletal muscles and viscera*.

N.B.: GH increases of weight and bulk of soft tissues except: Gonads, adrenal & thyroid (controlled by specific anterior pituitary hormones).

N.B.:

1-There are at least 4 types of somatomedin (A, B,C & D) but the most important one is somatomedin C or insulin like growth factor 1 (IGF1) then somatomedin A or insulin like growth factor 2 that is essential for fetal growth.

2-Females secrete more GH than males.

3-In adult, the GH level is low but important not for growth but for maintenance of the tissue mass by its protein sparing effect.

2- Metabolic Function:

A-On Protein Metabolism *(Anabolic Effect)*

(Protein sparer)

B- On Fat Metabolism *(Lipolytic & Ketogenic Effect)*

C- On Carbohydrate Metabolism *(Diabetogenic & anti insulin Effect).*

3-Lactogenic Function: **GH resembles prolactin in structure and thus it has some lactogenic effects.**

FACTORS AFFECTING THE SECRETION OF GROWTH HORMONE:

Factors increase

1-4 S: Starvation, stress (physical=exercise) (to ↑lipolysis &↓glucose utilization), sex hormones (estrogen & androgen) & sleep (deep stage II & IV)

2-2F: Fasting & ↓ FFAs and glucose

3-Protein meal or injection of AA (specially arginin)

Factors decrease

1-Caloric supply e.g. ↑ obesity & aging

2- ↑FFAs and glucose

3-Hormones: cortisol & somatostatin

= catabolic hormones

Prolactin

PROLACTIN

I-In Female:

1- It shares in the growth of breast at puberty and during pregnancy with oestrogen and progesterone.

2- It causes milk formation (↑ casein and lactalbumin).

3-It prevents of ovulation and produce of amenorrhea during lactation (due to ↓ FSH & LH).

II-In Male: It has no physiologic effect. But hyperprolactinemia → hypogonadism and impotence (due to ↓ FSH & LH).

Factors Affecting Prolactin Secretion:

1-Stimulation: by 4 S: suckling (sharp ↑), stress (exercise), sleep & sex hormones (estrogen).

Suckling Reflex

2-Inhibition by

A-dopamine (PIH)

B- prolactin (negative feedback).

C. Pregnancy

(prolactin receptors are blocked by ↑↑ progesterone & androgen, this prevents milk formation during pregnancy).